Technology enhanced learning: should artificial intelligence ever be used for teaching and learning?

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Technology Enhanced Learning: Should Artificial Intelligence Ever be Used for Teaching and Learning?

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Abstract

Artificial Intelligence (AI) algorithms are helping everyday life ranging from simplistic procedures such as self-service checkouts to the complexities of dispensing correct medication to patients. Likewise, AI is helping the education sector in unprecedented ways. Today AI is being used from simple online delivery of teaching through to the creation of virtual assistants and complex data analytics. However, AI related incidents, such as the recent failure of Zoom to prevent posting of obscene images and controversy over AI predicted A-level grades in England, reveal the vulnerability of AI programmes. These failures evidence that AI algorithms may behave contrary to the expectations of developers. Such incidents have caused concern about the reliability of AI, which has also been criticised as being unethical. With the help of various examples of the use of AI in the education sector as well as in everyday life, this article addresses the trust issues arising out the use of AI in teaching and learning. Are concerns about AI over exaggerated? Is this lack of trust due to misconceptions about AI systems? This article argues that although more needs to be done to make AI algorithms safer and reliable to overcome the existing misconceptions and lack of trust, the AI technology is developing very fast and already proving to be very useful in many areas of science and knowledge. The research concludes that AI should be trusted because by restricting its growth, it is likely to constrain our growth as a species.

Keywords: *Technology enhanced learning, Teaching and learning, Artificial intelligence, Social concerns, Misuse, Reliability, Trust, Human Development*

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Introduction

Machine learning is the capacity of a computer to learn from experience. It is the method to accomplishing Artificial Intelligence (AI) where a computer is programmed to improve itself after attempting to do a given task. Likewise, AI is referred to the implementation of machine learning into various systems that can complete tasks distinctive of human intellect. In the education sector, the use of AI is on the rise in an unprecedented manner. Today, AI is being used from simple online delivery of teaching through to the creation of virtual assistants and for complex data analytics. These uses have increased many folds due to the lockdowns and vulnerabilities compelled by the Covid 19 pandemic. Obviously, the use of IA is the need of time and not only provides useful tools to offer remote teaching but also brings efficiency in teaching and learning and enhances student experience.

However, recent AI related failures reveal the vulnerability of AI programmes. In April 2020, Zoom's AI system failed and released obscene images in online lessons being conducted via Zoom in Singapore and some other countries (Kucher, 2020). Another recent incident of a more drastic AI failure happened when the IA assisted A-level results in England in 2020 were widely perceived as unfair (See e.g. Coughlan, 2020). The IA failure in the case of Zoom caused panic in the face of Covid 19 pandemic, which has made the Zoom like tools indispensable. Likewise, the inadequacy of AI estimated A-level grades in England caused a serious controversy over the possible use of AI in teaching and learning (Coughlan et al, 2020). Undoubtedly, these incidents create reasonable doubt that AI algorithms may behave contrary to the expectations of developers.

These failures have serious short and long-term implications for the use of AI in teaching and learning. These incidents have caused concern in society about the reliability of AI, which has been criticised as being unreliable, unethical and untrustworthy as some fear that machines can learn to take over control from their programmers. Rapid advancements have been made in AI but more needs to be done to make AI algorithms safer and reliable, and overcome the existing misconceptions and lack of trust. Professor Alan Winfield, a leading researcher in robot ethics, has noted: "We need to build and engineer AI systems to be safe, reliable and ethical – up to now, that has not happened" (in Beckett, 2017). The understanding of AI experts is obviously that such issues can be fixed by investing more time and money into AI development and promoting broader understanding of the need and importance of AI in everyday life. Because as important as it is for AI systems to develop, people also need to learn how to deal with AI. This is already becoming a reality where AI algorithms are helping everyday life ranging from simplistic procedures such as self-service checkouts to the complexities of dispensing correct medication to patients.

However, many people tend to believe that AI developers will never be able to fully understand what information the algorithm is processing on a given task. This view has evolved due to a series of serious incidents involving faults in AI. These examples of AI failure show the vulnerability of AI programmes and clearly indicate that not only the technology is in its developing stage but also highlights the fact that algorithms may

behave contrary to the expectations of its programmers and developers. It also shows the critical limitations of AI developers to fully predict human behaviour in every possible scenario and programme machines accordingly, and of machines to fully understand, learn and respond to unpredictable human behaviour.

There are many other examples of similar AI failures in other fields. For example, a machine worker recently died setting up a stationary robot (The Guardian, 2018). The robot's AI programme malfunctioned and killed the worker by hitting him against a wall. While this can be considered as a malfunction, one could also analyse the situation from the perspective that the programme had self-learned the act after it received data about the situation because it is not always clear what the program is learning compared to the intended purpose. For example, if the system was presented with data of moving cars, say on a conveyer belt, the data could be misinterpreted to anything moving (Wakefield, 2016). This puts the accuracy and reliability of AI into question. This also shows that humans are unable to completely understand and predict how algorithms will process new data when presented with a new stimulus, increasing fear in the use of technology and reinforcing the lack of trust.

Nevertheless, these examples convey and emphasise the fact that development of algorithms is indeed in its infancy. Nick Bostrom and other leading AI experts believe that human level intelligence can be achieved by AI by 2050 (Bostrom, 2015), which is staggering given that is only 30 years from now. This inside view on the extent of AI development not just reveals that AI is more developed than common belief, but it also means that AI might be able to evolve to a point where it exceeds human intelligence sometime soon. By overtaking human intelligence, AI is likely to make most humans redundant by replacing them in manual roles not only in factories and checkouts but also in schools, colleges and universities.

It is quite clear that AI is going to make massive inroads in the education sector through online learning to customization of curriculum, leaning outcomes, and assessments (Nafea, 2017). There is also a real possibility that machines can replace teachers as we even have computer assistants now due to Google's new software 'the Google Duplex', which talks and acts like a human (Google AI Blog, 2018). Quite naturally, however, the Google Duplex has caused an uproar whether it is unethical to deceive someone, e.g. when answering phone calls, by pretending to be a human, and these developments clearly indicate why humans can be incredibly afraid of the rapid growth of AI.

These safety, reliability and ethical concerns have contributed to lack of trust between humans and machine learning algorithms, diminishing relations between man and machine. This fear is not irrational as the most successful and accurate machine is only 80% accurate (Hughes, 2017). Since AI is used in many ways in contemporary times, can these concerns be over exaggerated? Is this lack of trust due to misconceptions of AI systems? This article addresses these questions with a view to assess if the rapid development and increasing use of AI adds real value to teaching and learning.

What is AI and How it Works?

Alan Turing first conceived the idea of machine learning and AI systems in 1950 when he designed the 'Turing Test' to determine if a computer had real intellect (Press, 2016). For the system to succeed, the computer must be able to fool a human being into believing that the computer is similarly a human. In 1957, Arthur Samuels made the first machine learning programme designed to play checkers and improve game by game after learning various strategies. However, it failed the Turing Test (Press, 2016).

In 2014, a computer called Eugene Goostman posing as a 13-year-old Ukrainian boy managed to fool 33% of the judges. This was an incredible development in AI as Eugene needed to fool only 30% of judges to pass the Turing Test (BBC, 2014). However, the fact that a computer programme could only recently pass the test designed nearly 68 years ago means that the progress in AI systems has been slow although it has paved the way to making insightful new systems possible.

There are three main types of AI programming, namely: supervised learning, unsupervised learning, and reinforcement learning. Another semi-supervised learning is a hybrid of supervised and unsupervised learning (Cholaquidis et al, 2017), and will not be discussed independently.

Supervised Learning. Supervised learning is the act of a system being taught how to achieve a certain goal with a human moderator to ensure that the machine is learning what it is supposed to learn. This is done by supplying the computer with training data and then displaying the correct answers to the programme with the aim that the programme will be able to identify patterns form the data. Supervised learning processes the assumptions made by the human moderator on how the computer should learn the intended function. This causes the risk of algorithmic bias in the programme creating possibility to distort its functions and outcomes (Knight, 2017).

There are two most commonly used algorithms of supervised learning: 1) Linear Regression, which is mainly used in sale predictions where the algorithm uses the comparisons of real-value data and presents linear relationships between them (Fumo, 2017); and 2) Artificial Neural Networks (ANN), which is a computing system that performs different tasks by learning from examples like biological neural networks (Fumo, 2017).

Supervised learning is trusted by many because a human moderator is involved, meaning that it is the responsibility of moderator to ensure that no harm is done. However, because it involves human bias, there is a greater risk that the programme will be bound to follow the ideals of human moderator and can be misused. Another issue with supervised learning is possible inaccuracy. One example is the 'Instant Physician' which is a well-known ANN enabled supervised learning application first developed in mid-1980s (Patel and Goyal, 2007). The Instant Physician stores vast amounts of medical records in a neural network. This enables the ANN to produce prescriptions by detecting disease patterns. This is then replicated and if another patient with similar symptoms is

diagnosed, the ANN generates the same prescription. A known issue with ANN is that even a "good prediction accuracy in machine learning is about 90 percent" (AltexSoft, 2017). When compared to human errors, data shows that prescription errors which can cause serious harm is 4 in 1000 patients or 99.6% accurate (Velo and Minuz, 2009). This shows that even though ANN systems are phenomenal they can still be improved, because an error in prescription, can cause a patient more harm than good.

Unsupervised Learning. There is no human moderator involved in unsupervised learning and the computer is taught through unlabelled data, i.e., data which does not contain any direction for a computer programme, requiring the programme to find patterns within that data without external information. As the programme is not aware of the 'correct' answer for the data, the patterns detected are then interpreted by a human moderator. This means that any previously unknown patterns to humans can now be found and could prove to be useful. This also means that companies, especially in telecom sector, can use unsupervised learning for revenue assurance or RA, which can save companies billions that they would have otherwise lost due to revenue leakage (VanillaPlus, 2017).

Most commonly used algorithms for unsupervised learning are 'k-means clustering' and 'Association Rules'. K-means clustering works by grouping similar data together based on links made by the algorithm, whereas Association Rules aims to find previously thought undistinguishable relations between items in data.

There is no human bias in the pattern recognition of unsupervised learning because it is not based on assumptions of a human moderator. Therefore, the programme is likely to fulfil its original function and can "help in deriving meaningful insights and describe the data better for users [to understand]" (Press, 2016). The mechanical application of unsupervised learning is mainly in robotics. For example, a robot is programmed to conclude without any input from the user that dust is collected around the house and then its conclusion is fortified every time it detects the dust (Spacey, 2017). However, unsupervised learning is considered very dangerous due to growing concerns over the use of AI-enabled robot weapons by terrorists and rogue states against civilian populations (Busby, 2018).

Another example of AI-enabled robots are self-driving cars that rely entirely on an algorithm teaching itself to drive by watching a human do it. This is done by receiving data through various sensors observing a human driver. The robot is programmed to process data and learn patterns used during driving. As the driving robots are programmed to self-learn without any situation specific instructions provided by their programmer, it isn't entirely clear how it will make decisions and how the most advanced algorithms do what they do. It can perform unexpected actions, for example, crash into a tree or cross a red light (Knight, 2017). What if the programme can develop its own ideals and start acting by its own impulses, a problem commonly known as the 'black box'?

Reinforcement Learning. Reinforcement learning is where an algorithm (commonly referred to as an 'agent') learns how to react to an environment. Unlike the supervised

and unsupervised learning, the data for reinforcement learning is non-existent, or is not required as it could be costly and may cause delays (Sutton, et al, 2018). In reinforcement learning, the programme is supposed to predict which answer to the current environment leads to benefits (commonly referred to as 'reward'). This leads to the agent, reflecting upon its action and improving its knowledge and deciding which answer leads to loss (commonly referred to as 'punishment'). This loop is continued until a 'terminal state' (the end command sent to stop the agent from learning anymore form the given environment) has been sent by the environment (Barto, et al, 2018).

Some of the most commonly used algorithms for reinforcement learning include 'Q-learning' and State-Action-Reward-State-Action (SARSA). In Q-learning, the main goal of the system is to learn a rule used to perform a specific action under the given circumstance; and SARSA is the act of rewarding the system when it performs the correct task. Another Deep Q-Network (DQN) is used as an alternative to Q-learning. DQN has been developed to fix Q-learning's issue of lack of generality of a given task, because the process can only cater to specific programmes (Kung-Hsiang, 2018). DQN can fix this issue by using aspects of supervised learning and ANNs. Unlike Q-learning, DQNs are hybrids of supervised and neural networks because they can determine the appropriate course of action for an unseen situation. This makes them more suited for gaming programmes (Kung-Hsiang, 2018).

Google's 'AlphaGo' is the most renowned application for reinforcement learning. AlphaGo was programmed to play 'Go', which is a popular board game where the aim is to take over more territory than the opponent (Thomsen, 2019). AlphaGo stunned the world in 2015 with its first formal match against the reigning three-times European Champion Fan Hui with a 5-0 victory. In 2016, AlphaGo then proceeded to play Lee Sedol, the winner of 18 world titles, and won with a victory margin of 4-1. This margin of 4-1 shows that AlphaGo, even after beating the "greatest player of the past decade" (DeepMind, nd), is not perfect and that its AI system needed further development. AlphaGo proved its improvement in 2017 when it had a streak of 60 wins on an online game against professional players. Importantly, however, this time the improvement to the algorithm was achieved through AlphaGo playing itself rather than human players (Thomsen, 2019). So far there is no growing concern over reinforcement learning's trust issues, although, due to the exceptional performance of AlphaGo, some people believe that this sort of technology can be militarised causing concerns over its possible misuse.

Can We Trust AI?

The dictionary definition of trust is defined as: "Firm belief in the reliability, truth, or ability of someone or something" (Oxford English Dictionary, nd). However, in reality trust can be defined differently depending on specific situations. Trust lays the foundations for a stable relationship and mutual understanding. For family and friends, it is the assurance that they will act in the best interest and well-being of the other person without anything in return. In politics and democracy, a leader is elected by the people where a politician asks for support and the people ask for the well-being of their country

and livelihood. In both these examples, trust means the confidence in one party that they always act in the interest of the other party. Judging by the same definition of trust, can AI be trusted by humans that it will always act in their interest?

This research argues that AI can be trusted. This is because the benefits that AI carries are long term and outweigh the drawbacks. However, both sides of the arguments must be considered in order to draw this conclusion. On one hand, humans are currently programming AI systems. This shows humans' trust in the AI as they expect the algorithm to complete a given task, nothing more nothing less. On the other hand, humans are not able to predict the outcome of an AI system because of its cognitive ability to continuously learn, which could mean that it learns something that was never intended and diverge from its original purpose. This causes doubts and fears in humans, and they tend to believe that an AI system will not compute and process in their best interest and well-being. Nevertheless, AI should be trusted because by restricting its growth, it will likely constrain our growth as a species. This does not mean that the growth of AI should be left unchecked. Instead we should allow the systems to progress, while monitoring their success and development.

AI has many applications in the modern world, one of which is space exploration. AI supported machines can go where human cannot go as of now and can play a leading role in making critical discoveries about the universe around us. The Curiosity Rover, for example, is currently on the planet Mars where it has discovered what is referred to as 'ancient water'. In addition, space agencies, such as NASA and SpaceX, are developing AI programmed space crafts with the capacity to make decisions on their own. This will prove beneficial, for example, if planet Earth becomes inhabitable in the future due to pollution and Global Warming and space colonisation becomes the only viable option. With the success of Curiosity Rover, we know that IA programmed aircrafts can travel vast distances without making the slightest error. This is where a machine, free from emotions that could result in life loss in the millions, can help preserve humankind. It can be argued that more investment should be made to discover new methods of tackling Global Warming. This will not only benefit humans but also countless other species that live on the planet. Analysed from a long-term perspective, it is clear that the Earth is growing smaller, and the human population is increasing, which therefore means that the Earth's resources will eventually be consumed, and space colonisation will be the only viable option.

Moreover, there is an immense potential for AI's contribution to science. AI is being implemented in the largest particle accelerator on Earth: The Large Hadron Collider (LHC) in CERN, where AI programmed machines are being trained to make the next big discovery after the 2012 discovery of the Higgs Boson. Another reason to embrace AI in this field is that the LHC "produce[s] about a million gigabytes of data every second" (Gnida, 2018). The AI in question is being trained using ANN to detect patterns and remnants of collisions between particles, which are currently undetectable by non-AI based algorithms. Although there have been no discoveries so far due to AI (Purcell, 2019), these developments clearly show how AI is leading to progress in knowledge.

These successes imply that AI is at the forefront of human advancement in scientific discoveries, which would not be possible if AI was not trusted.

It can be argued that if AI can be used for scientific discoveries, then it is also possible to militarise the technology. For example, AI missile guidance systems are being developed and tested. Although we all want world peace, we know that sometimes war may become inevitable. The good thing about militarisation of AI is that human navigators will be discarded if these weapons are developed. Because AI is less prone to repeat the same mistakes, the removal of human emotions will result in successful missions. In most cases this would be an advantage for the development of AI, however, the drawback is the damage caused and the lives lost due to the precision and accuracy of AI guided weapons. This remains to be one of the factors that cause concern for the use of AI. However, because these systems are developed under supervised learning, humans are aware of what the system has learnt. With this information it will be possible to devise an anti-missile system, which will act as a counter measure to the missile, thus assuring the safety of the targets.

Another reason why AI should be trusted is its proven record of autopilot systems used in airplanes. It is statistically proven that an algorithm based on machine learning is safer than the pilot at landing an aeroplane in adverse weather conditions. This process is known as 'Autoland'. However, the system is still being supervised by humans in case of emergency faults which could cause an accident. In this situation AI saves lives by preventing accidents.

Furthermore, the thought of a fully piloted AI automotive vehicle might be far off in the distant future, this does not mean that different driving features to assist drivers cannot be created using AI. For example, the self-parking feature available in many cars is based on AI. It is convenient for drivers, as it could be difficult to park a car in a tight spot after a long drive, which means that there is less chance of an accident. These AI systems are saving money for drivers and insurance companies. In addition, this also means that the parked car will be parked at an efficient distance from the other cars due to the programme's features, which will maximise parking spaces in congested areas.

Additionally, it can also be used to assist new drivers who, for example, often find it difficult to parallel park on an incline. However, one drawback of this is that the driver will not need to learn crucial parking skills and will not be able to park when the system is down. This leads onto the second drawback - the reliability of the programme. This algorithm uses reinforcement learning, which means there is a chance that the programme has learned the incorrect solution to the task. However, because of the strict laws and regulations on car safety and the rigorous testing done on cars, it is very unlikely that the car will have a malfunctioning system. This should start to give more people the assurance that AI is safe and useful in many ways.

On the other hand, there are known cases where AI has proven to be less safe than humans. The examples are already discussed above including the death of a woman in Arizona caused by a driverless car operated by an AI programme and of factory worker in the German Volkswagen car manufacturing plant by the hands of an AI programmed

robot. Although rare, these events are constantly depleting the already fragile trust between humans and machines. At the same time this also shows the phenomenal progress that AI technology has made. If AI has achieved the capability of safer landings after only 50 years of research, there is potential that it will improve immensely in the next 50 years. Therefore, these accidents only show that AI is a work in progress, but with serious prospects to achieving things currently unimaginable.

Yet another advantage of AI is the development of automated dispensing systems (ADS) for pharmacies. ADS are used to dispense the correct prescription to customers with high levels of accuracy. This reduces the workload on humans, which means more resources can be spent in other essential areas, such as emergency health care, and repeat prescriptions can be left to ADS. This also means that the patient will likely get the correct prescription and hence reduce human error. However, some argue that the maintenance costs of the system outweigh the overall benefits, and hence oppose the idea. As the system is currently implemented at only a few small locations, it is difficult to support any side of the argument.

Likewise, the Instant Physician system discussed above is also a useful AI technology although there are concerns regarding its accuracy. The Instant Physician is a highly sophisticated system that uses both supervised learning and ANN. Since it is not 100% accurate, people are likely to doubt its capabilities. However, like the missile navigation system and the aeroplane landing algorithm, Instant Physician operates under supervised learning. The programme has access to large amounts of previous medical data ensuring that the correct prescription is given to the patient according to their disease pattern. An added advantage of giving an ANN integrated AI system access to medical data is that it will be able to recognise data patterns previously unnoticed, which could help monitor the progress of certain diseases aiding preventive actions.

Another concern that people have regarding AI is that of privacy. People are concerned that large amounts of personal data used by AI systems can be easily hacked into and misused. Ironically, however, reinforcement and unsupervised learning systems are being used currently in anti-virus and anti-malware software. Almost all anti-virus software uses some sort of machine learning in their programme, most commonly reinforcement learning. This results in more efficient code for the programmers and a better sense of security as the virus software is unable to bypass security which can adapt to any type of virus or malware. Important sectors where such anti-virus systems are implemented include the national health service to protect the medical records of the patients, and in internet security systems.

While this means better security against viruses and malware, it also means that the same algorithms can be used to create viruses. This is an obvious drawback. Another drawback that people are concerned about is that of data mining using machine learning. Big companies, such as Google, Facebook, Twitter etc., use machine learning algorithms to data mine the users' activities. With this information they are able to personalise adverts, which both help the user and the company. This may seem like an advantage at first, however, the issue arises when the data is handled without care. The most recent

example is the misuse of data by Cambridge Analytica. The use of data mining has also enabled security officials to track wanted criminals and suspects, which helped prevent crimes and in turn save many lives. Therefore, even though there are concerns over the misuse of machine learning by accessing personal data, it is worthwhile to note that if it wasn't for the trust in the accuracy of machine learning, preventing serious crime would have been more difficult.

Furthermore, AI is being used in CCTV systems in order to identify obscure faces using previously uploaded images. This has increased security, however, there is a concern that right to privacy is being compromised. However, for the better of the majority and in order to prosecute criminals and prevent crimes, it is wise to implement such systems in more areas. In addition, having AI operated systems would result in the removal of human error, which will most likely result in saving more lives. Furthermore, because people's personal data is being used with nothing but safety and security in mind for the people, this should help people realise that AI systems should be trusted.

Moreover, many people argue that the use of AI will result in increased pollution due to increase in the use of electricity. This claim may be correct; however, AI is actually helping in the reduction of pollution and global warming. By analysing data patterns, AI systems have the ability to predict the state of pollution in the future. This information can be used to tackle global warming before it becomes unmanageable, giving people a clearer viewpoint on how the world is changing. So far, with ANN climate change, scientists have concluded that by the year 2100, the average temperature of the Earth will be 4° (Farmen, 2019).

Similarly, ANNs are also being used for flood impact analysis. This is important because of the lack of information due to the current scale of flooding caused by rising levels of the sea. Machine learning is used here rather than other methods, because it is able to calculate multitudes of adaptations for different cities for flooding crisis, whereas currently a small number of solutions are in circulation. This would result in saving more lives and tackling climate change, making the world more inhabitable for humans and other species. This should in turn enhance the trust between AI and humans because of the benefits it provides.

In addition, AI is being used in retail stores to reduce or prevent theft. This is done by using the pre-installed cameras on top of the counters in retail stores. The cameras are uploaded with a software called 'ScanItAll', which ensures that the employee will not be able to cheat the system, for example, for a family member, or accidentally not scanning the barcode, or the customer taking the item without being scanned and paid for. The reason that AI is used and not a non-AI based programme here is because without the use of reinforcement learning it will be difficult for the modern-day sensors and processors to identify new techniques used for theft. Thieves, can, for example, stack multiple types of one item on top of one another or pretend to scan the item. Modern-day sensors will have the techniques of theft preloaded into its system not only saving money but also enhancing safety of customers as well as staff (de Jesus, 2019).

Another benefit of using such technology is that it can be used to obtain data on shopping patterns of customers, providing vital information on product placement and the number of purchases. This data can be used to better advertise products and increase profitability. However, there is a concern that such data can be used maliciously. This is a justifiable concern, however, there are strict laws in place which label data misuse as a crime. This should begin to create trust between people and AI.

Technology Enhanced Learning

Technology-enhanced learning (TEL) is described as the application of technology including AI to teaching and learning. In recent years, TEL is undoubtedly transforming teaching and learning in an unprecedented manner (Cullen, 2018). The most apparent use of AI in the post Covid 19 pandemic is the aid and assist in the safe and proper functioning of online lecturing and meeting platforms such as Zoom etc. However, this is not the only way in which AI is transforming the contemporary teaching and learning experiences. Although all conceivable uses of AI in teaching and learning cannot possibly be listed, there are several notable areas where AI is revolutionising the contemporary teaching and learning (Lynch, 2009).

First of all, the use of IA in teaching and learning will increase efficiency and competence**.** The use of AI as a means to ensure safe or limited use of internet and online resources is well-known as most online browsing filtering tools use IA (Dickson, 2019). However, AI is also helping in the real time delivery of teaching and learning. For example, the emerging use of AI in educational institutions around the globe aims at enhancing competence and efficiency in completing regular classroom tasks ranging from basic management and scheduling to more complex tasks such as lecture planning, module content development, and setting up assessments (Sears, 2018). Likewise, electronic grading systems have evolved that use computer tests (VerMilyea et al, 2020). Further developments in AI based assessments and grading will mean that teachers can defer most of their assessment and feedback activities to machines and will be able to give more time to students and teaching preparations. However, we need to approach these developments with a degree of caution given the recent controversy in England over the use of AI in assessments and estimation of results (Coughlan et al, 2020). Undoubtedly, the IA technology in this area, as it is in any other area, has a long way to go before it can be trusted without any hesitation.

The use of IA has also contributed massively to conducting the learning need assessments. AI provides an excellent tool to assess the learning need of students. With the help of AI, teachers can collect and analyse data in a way that was never possible for a human brain. The AI based analysis can help to create personalised learning pathways based on learning needs of each student (Sears, 2018). Likewise, AI provides the possibility to predict performances based on existing data. From the teaching perspective, this form of predictive analytics helps predict student performance and identify areas that need further improvement. From the learning perspective, this

provides the possibility of helping students choose options in which they are likely to perform better and eventually assist decisions on possible career choices. (Sears 2018)

Conclusion

In conclusion, AI will be most useful to us when we understand and trust it. Due to occasional failures and possible misuses of AI, it is understandable that people have concerns and the concept is mistrusted. However, most of these concerns are due to common myths and lack of understanding about AI. The analysis of various uses of AI reveals that it is helping millions of people every day without them realising it. AI is being used to achieve scientific advancements, prioritise human safety, online security and crime prevention. It is also being used to improve health through early detection and prevention of diseases and is helping to maximise business profitability in many ways. Undoubtedly AI has already proved itself to be a tool for long term sustainability and development and is likely to become an integral part of human life in the future.

Likewise, IA has a significant role to play in teaching a learning. In addition to being an invaluable tool to conduct remote teaching and learning, AI provides several possibilities to assist in classroom tasks and enhance teaching and learning experience. The significantly benefits of AI outweigh its possible faults and it is likely that AI will continue to make massive inroads in teaching and learning in the future.

Yet, such an extensive use of AI calls for caution requiring higher ethical and professional standards from the developers. There are always problems in the early stages of development of new and advanced technologies. The AI technology is developing very fast and although more needs to be done to make it safer and reliable, it is already proving to be very useful in many areas of science and knowledge. AI should be trusted because by restricting its growth, it is likely to constrain our growth as a species. This does not mean that the growth of AI should be left unchecked. In order to fully make use of AI, we should allow the systems to progress with appropriate checks and balances in place.

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